1204.1

1.10

(1.9)

Army Sites

1.18

MN.0-01-1

JUL 2 3 1982

Col. John D. Spence
U.S. Army Toxic and Hazardous
Materials Agency (DRXTH-AS)
Department of the Army
Aberdeen Proving Ground, Md. 21010

Dear Col. Spence:

In response to your letter of May 17, 1982, requesting the identification of sites where radiological materials may have been left or buried on U.S. Army installations, I am enclosing listings of military installations that may have been involved with the Manhattan Engineer District/Atomic Energy Commission (MED/AEC) activities. Enclosure 1 is a list and brief summary of all Army sites and Enclosure 2 is the list of military installations other than Army facilities. Enclosure 3 is the answers to the questionnaire as outlined in your letter for selected Army and former Army sites. The information presented is the best available to us at this time. A fourth list of sites containing names and AEC association is being prepared. Being formerly restricted data, this list must be handled as confidential data and will be forwarded under separate cover.

If there are any questions, please call me on 301-353-3016 or Mr. Arthur J. Whitman of my staff on 301-353-5439.

Sincerely,

Original signed by:

William E. Mott
Acting Director
Public Safety Division
Office of Operational
Safety (EP-323)

3 Enclosures

bcc:
Aerospace
A. Whitman, EP-323, w/encl.

EP-323:AJWhitman:dlm:353-5439:7/22/82:EP-323-82-209:OA-00

7/22/82

CONCURRENCE	
RTG. SYMBOL	EP-323
INITIALS/SIG.	WEMott
DATE	7/27/8
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ENCLOSURE 1

LIST OF ARMY SITES THAT HAVE OR MAY HAVE
HANDLED NUCLEAR MATERIALS FOR THE AEC OR MED

Alabama Ordnance Works Sylacauga, Talladega County, Alabama	The Manhattan Engineer District constructed a heavy water plant at this site. It operated from January 1944 to June 1945. The plant capacity was 1600 pounds of heavy water per month. There is no reason to suspect any residual radioactivity from these operations.
Granite City Army Depot Granite City, Illinois	Records obtained by Aerospace from the Oak Ridge Records Center indicated that this site was used for storage of about 3,000 tons (24,852 drums) of rare earth residue and 400 tons (3,437 drums) of thorium residue. The residue was owned by GSA, Defense Materials Service, and was licensed. The drums were in poor condition (may have been leaking and contaminating the storage site). The material was apparently moved to either the Weldon Spring, MO raffinate pits or the quarry late in 1964. The current status and ownership of the site has not been determined. Because the site is formerly licensed, NRC rather than DOE should pursue the investigation. Aerospace is not actively collecting data pertaining to this site.
✓ Illinois National Guard Armory (Washington Park Armory), Chicago, Illinois	This facility was used by the Metallurgical Laboratory for storing and processing uranium. Argonne National Laboratory has conducted a radiological survey of the site and identified some contamination in the facility. A final survey report is in preparation.
✓ St. Louis Ammunition Depot E. St. Louis, Illinois	A former AEC employee (worked in the St. Louis area) recalled that this site was used for storing some AEC materials. No information regarding this site has been identified to date. It is possible that it is the Granite City Army Depot material or may be one of the St. Louis, MO, facilities. Aerospace investigations for data on the site are low priority.
Rock Island Arsenal Rock Island, Illinois	The facility was used for some contract work with LASL, however, there is no indication that radioactive materials were involved. Aerospace is investigating the site but the activity is low priority.

	The Manhattan Engineer District constructed a heavy water plant at this site. It operated from December 1943 to July 1945 and had a monthly production rate of 2400 pounds of heavy water. There should be no residual contamination expected from the operation.
Wabash River Ordnance Works, Newport, Vermillion County, Indiana	This site was also listed in a 1951 HASL Annual Report. A HASL team visited the site and performed a safety inspection. No mention is made of the type of work being conducted at the facility; however, it was noted that some of the work was transferred to Savannah River. The location of this site has not yet been determined. Aerospace investigations for data on the site are low priority.
Burlington Ordnance Plant Burlington, Iowa	The site was cleared for unrestricted use in 1975. Details regarding the former operations are not available at this time.
Watertown Arsenal Watertown, Massachusetts	MIT operated, under contract AT(30-1)-956, a laboratory and uranium testing facility at the arsenal. A modified ion exchange technique was developed at the site. Building 421 was the main facility and there was some indication that buildings 34 and 41 were also involved. The areas have been turned over to the local redevelopment authority. A second area north of Arsenal Street was used by the Army for uranium storage and as a burn area. A radiological survey of the area around Building 421 (only the pad remains) identified low levels of contamination on the pad which exceeded surface contamination guidelines. Argonne National Laboratory completed a survey of the other areas of the site; however, the results are not yet available.
Boston Army Base, Massachusetts	AEC Contract rosters indicate the AEC had contract AT(30-1)-1502 with this site. The contract began 1/20/53 and ran for an undefined period. Aerospace has not yet determined the type of work. The actual location of the site is also unclear; it may be one of the research facilities in Watertown or Natick.

Twin Cities Army Ammunitions Plant, New Brighton, Minnesota	This site was formerly licensed (under 10CFR 70) by the NRC. A review of license dockets determined that there was insufficient data to be sure the site was adequately decontaminated.
Weldon Spring Site St. Charles County, Missouri	In 1956, 219 acres of the Former Weldon Spring Ordnance Works was acquired by the AEC for use as a uranium feed material processing center. The facility was closed in 1966.
-- Army Owned Portion	About 169 acres including process building and support facilities were returned to the Army in 1967. Portions of the site are contaminated with uranium and thorium processing residue.
-- DOE Owned Portion (Pits & Quarry)	DOE maintained control of the portions of the site containing processing wastes. This includes a nearby quarry and raffinate pits located adjacent to the processing plant.
Picatinny Arsenal Dover, New Jersey	A records search completed by Albuquerque Operations in 1974 indicated that no radioactive materials were used at the site. However, during a 1981 review of EML records, Aerospace found records at EML indicating HASL conducted inspections of a uranium machining operations at the site. There is no record indicating who the machining was for.
✓ The Lake Ontario Ordnance Works, Lewiston, New York	A portion of this former ordnance works was acquired by the AEC and used for storage of residue and scrap and later for a boron-10 plant. DOE controls about 191 acres of the former site which still contains uranium processing residues. About 1300 acres have been released by the AEC to other agencies or private parties. The DOE is presently reevaluating the radiological status of these properties. A background report on these activities is expected to be published in July 1982.
The Seneca Army Depot Romulus, New York	Ammunition Bunkers at the site were used during the early 1940's for storage of uranium ore. Some pitchblende ore with uranium and radium and their daughter products was identified in and around the bunkers by DOE surveys.

Marion Ordnance Works Marion, Ohio	An Aerospace review of EML records identified a HASL survey report that indicated meta-scopes were stored at this site. No other information has been found to date. There is no indication AEC had any contractual activity at the site.
Aluminum Company of America Fort Belvoir, Virginia	HASL conducted health and safety inspections of the site; however, there was no indication of AEC involvement with the reactor other than for health and safety inspections.
Morgantown Ordnance Works Monongalia County, West Virginia	The Manhattan Engineer District constructed a heavy water plant at this site. It operated from December 1943 to September 1945. The plant had an 800 pounds of heavy water per month capacity. There is no reason to suspect any residual radioactivity at this site.

ENCLOSURE 2

MILITARY INSTALLATIONS OTHER THAN ARMY FACILITIES

Naval Ordnance Test Station P.O. Box 70 China Lake, CA	Identified in MED history as being used for project CAMEL. Also listed on 1955 Accountability Station lists.
Naval Auxiliary Air Station Salton Sea, CA	Identified in MED historical records. Activity unknown; may be associated with bombing tests. Probably not associated with radioactive material.
Navy Yard Mare Island, CA	Identified in MED historical records. Shipped material to Tinian. No association with radioactive material identified.
Naval Ammunition Depot Port Chicago, CA	Identified in MED Historical records. Stored explosive components of the bomb. No association with radioactive material identified.
U.S. Naval Radiological Defense Laboratory, Health Physics Division San Francisco, CA	Listed on 1955 AEC Accountability Station list.
Naval Research Laboratory Code 3100 Washington, D.C.	Conducted R&D on thermal diffusion.
Bureau of Ships U.S. Navy Washington, D.C.	Involved in power reactor development.
Naval Ordnance Laboratory White Oak Silver Spring, MD	Listed on a 1955 AEC Accountability Station list.
Naval Ordnance Plant Centerline, MI	Identified in MED records, assembled bomb components. No known association with radioactive materials.
U.S. Naval Ammunition Depot Red Bank, NJ	Stored radioactive materials prior to sea immersion for disposal
Naval Office at the University of New Mexico Albuquerque, NM	Transshipment station for equipment to Los Alamos.
Chupedera Mesa White Sands Missle Range, NM	Bomb test site, fallout area.

Sandia Base Oxnard Field, NM	Supervised Trinity site and listed as an Accountability Station for SS material.
AEC Warehouse, Bldg. 546 E and 17th Street U.S. Naval Supply Depot Scotia, NY	Shared uranium billets and rods.
Air Force Plant 36 Evandale, OH	Conducted licensed activity and AEC contractual work.
Wright Air Development Center Air R&D Command Wright-Patterson AFB, OH	Identified in EML records probably in calibration facility
U.S. Navy Yard Philadelphia, PA	Operated a Thermal Diffusion Pilot Plant.

IDENTIFICATION OF RADIOLOGICALLY CONTAMINATED SITES

Watertown Arsenal
GSA Civil Defense Depot
234-237 Arsenal Street
Watertown, MA 02172

Point of Contact: L.F. Bretta (GSA Regional Administrator)

Watertown Redevelopment Authority
463 Arsenal Street
Watertown, MA 02172

Point of Contact: Michael Matt

1. Contaminated Sites Data

The current area of the Army properties includes less than 50 acres. The DOE investigation cover 2 areas. One was south of Arsenal Street and is no longer part of the Army facility. It is controlled by the Watertown Redevelopment Corp. Building 421 in this area was used by the MED/AEC in the development of processing methods for various uranium ores. A second area north of Arsenal Street was also noted as having been involved in uranium operations during the MED/AEC era. Both areas were surveyed by DOE.

2. Operational Data

Name	Status	Dates
Development of RIP Process and Analytical Laboratories	Past	1946-1951

3. Type of Contamination

The site was found to contain natural uranium supposedly in equilibrium with its decay products.

4. Radiation Levels

Maximum Radiation Level	Type of Measurement	Frequency of Monitoring	Monitored by
2.2×10^5 dis/min-100 cm^2	Surface Contamination	1 Time	DOE

5. Decontamination Plans

No decontamination plans exist at present.

IDENTIFICATION OF RADIOLOGICALLY CONTAMINATED SITES

Weldon Spring Site (Raffinate Pits)
St. Charles County, MO 63302

Point of Contact: Department of Energy, Defense Programs - A. Kluk

1. Contaminated Site Data

This 51 acre area was a portion of the former Weldon Spring Ordnance Works. Four pits in this area were used by the AEC for the storage of radioactively contaminated raffinates that remained from the processing of uranium feed materials. The 219 acre Weldon Spring Feed Materials plant was operated by the AEC from 1957 to 1966. The Army reacquired all but the 51 acreas of the AEC facility after the plant was closed down.

The four pits have about 130 million gallon capacity.

2. Operational Data

Name	Status	Dates
Pit #1	Storage of processing residue (mostly neutralized raffinates)	1958-Present
Pit #2	Storage of processing residue (mostly neutralized raffinates)	1958-Present
Pit #3	Storage of processing residue (78% full, neutralized raffinates)	1959-Present
Pit #4	Storage of processing residue (primarily thorium processing)	1964-Present

3. Type of Contamination

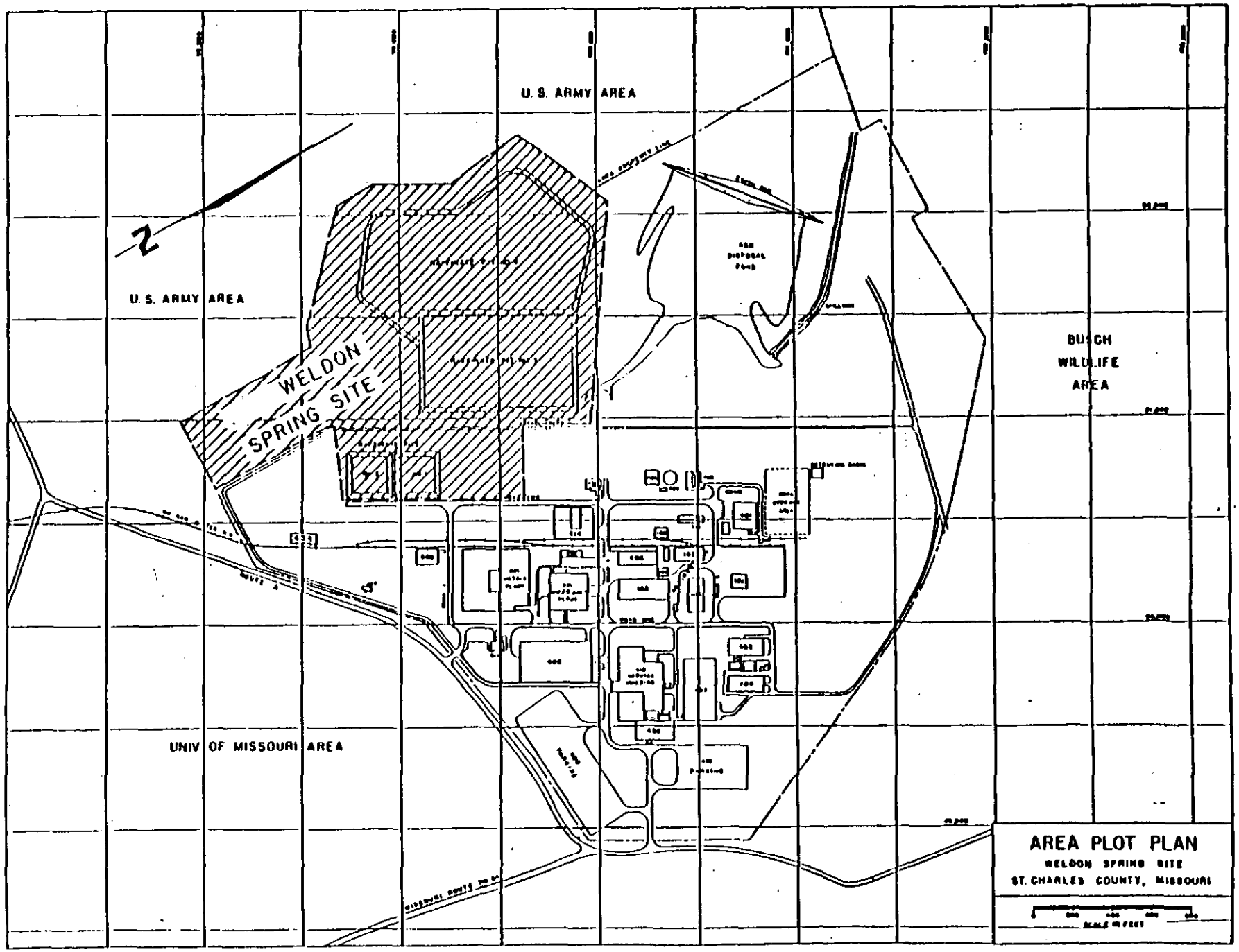
Pits 1, 2, and 3 contain 470,000; 470,000; and 3,500,000 cubic feet of residue respectively with about 0.15% uranium and 0.05% thorium. Pit 4 contains 1,500,000 cubic feet with 0.15% uranium and 1.5% thorium.

4. Radiation Levels

The pits contain 20 μCi/Kg of activity.

5. Documentation Plans

The Department of Energy has scheduled the raffinate pits for remedial action under its surplus sites program. However, final selection of remedial action options and time of remedial action have not yet been made.


U. S. ARMY AREA
U. S. ARMY AREA
WELDON SPRING SITE
BUSCH WILDLIFE AREA
UNIV OF MISSOURI AREA
AREA PLOT PLAN
WELDON SPRING SITE
ST. CHARLES COUNTY, MISSOURI

IDENTIFICATION OF RADIOLOGICALLY CONTAMINATED SITES

The Former Lake Ontario Ordnance Works
Lewiston, NY 14092

Point of Contact: Department of Energy, Office of Nuclear Energy (R.W. Ramsey)

1. Contaminated Site Data

The AEC portion of the Former Lake Ontario Ordnance Works consisted of 1,511 acres. The site was acquired from the Army in 1944. It was used for the storage of radioactive materials, including residues from the processing of pitchblende ore, uranium billets, rubble from decommissioning of MED facilities and other wastes. A boron isotopes separation plant was also constructed and operated on the site.

Only 191 acres of the facility are presently controlled by DOE. The remainder of the site is now owned by other government agencies and private individuals or companies. The entire site is scheduled for resurvey. The Department of Energy has completed a comprehensive radiological survey of the areas controlled by the Department and has initiated surveys at selected portions of the other parts of the site. For the purposes of the survey, the site was divided into 31 areas plus the DOE part of the site. Figure 1 shows the location of the areas and Table 1 lists the areas.

2. Operational Data

Name	Status	Dates
DOE Storage Site	Ongoing	1944-present
Former AEC properties used for storage of wastes	Past	1944-mid-1950's

3. Type of Contamination

The current DOE site is used for the storage of residue that contain significant concentrations of Radium-226 and its decay products. Other wastes stored on the site previously also contained other radionuclides including fission products.

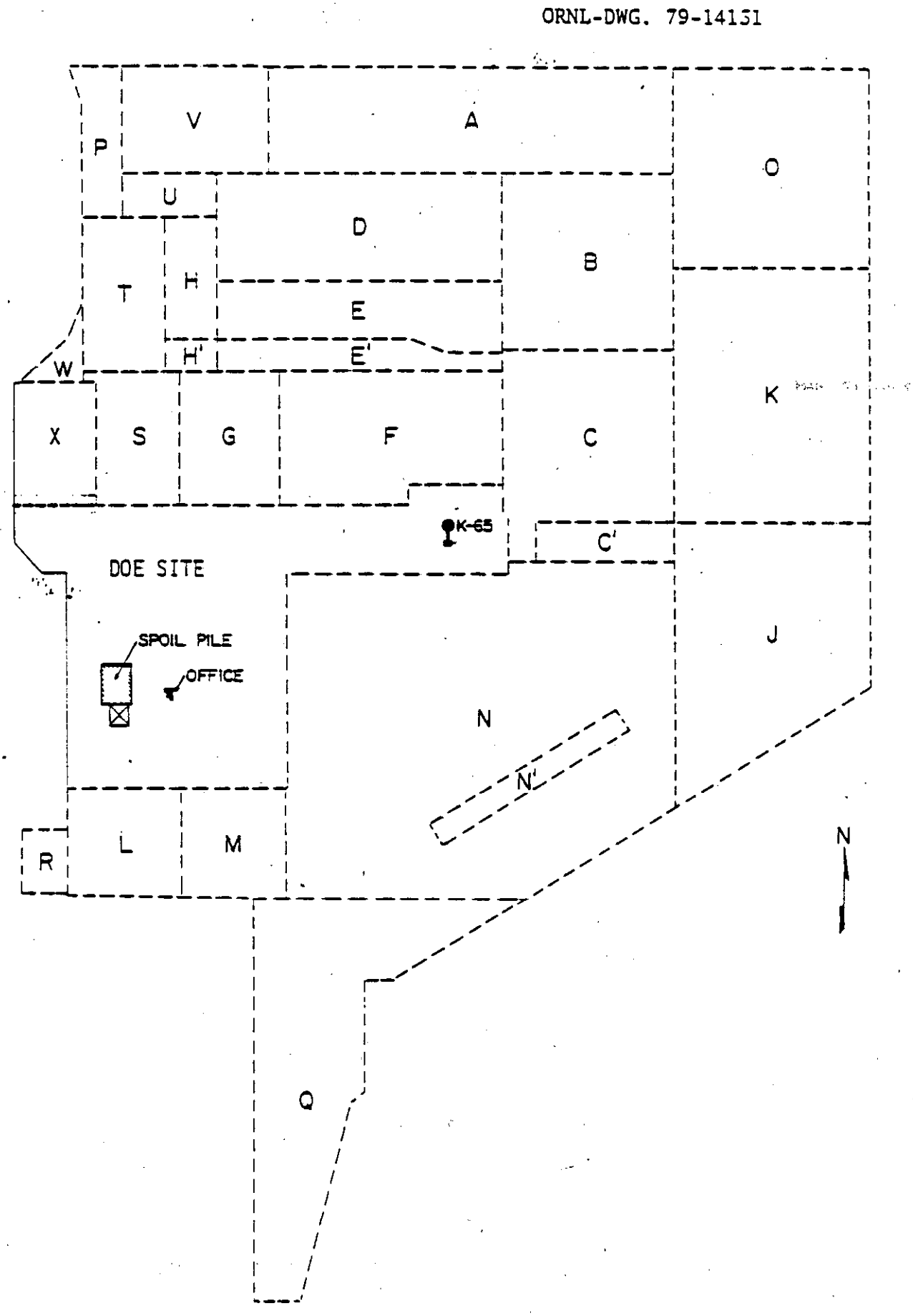


Figure 1. Location of survey areas at Lake Ontario Ordnance Works site.

Plot*	Average* (est.)	Owner	Physical Condition	Suspected Contamination
A	90	SCA	Overgrown	None
B	59	SCA	Overgrown and Swampy	Spotty
C	66	SCA and Washuta	Lagoons and Landfill	Shine and Spotty
C'	10	Washuta	Overgrown and Swampy	Shine and Spotty
D	65	SCA and Somerset	Landfill and Open	Spotty
E	37	SCA	Process Area	Spotty
E'	19	SCA	Process Area	Rubble Storage
F	52	SCA	Landfills, Ponds, and Swampy	Shine and Spotty
G	29	SCA	Ponds and Overgrown	Waste Storage
H	16	SCA	Overgrown	Spotty
H'	5	SCA	Overgrown	Waste Storage
J	102	SCA	Overgrown	Clean
K	110	SCA	Overgrown	Clean
L	27	DOL	Open	Shine and Spotty
M	25	DOL	Open	Shine and Spotty
N (north)		Washuta	Overgrown	Removed by Owner
N (south)	265	DOL	Overgrown	Spotty
N' (north)		Washuta	Some Brush	Rubble Storage
N' (south)	13	DOL	Some Brush	Rubble Storage
O	99	USAF	Maintained	Small Spots
P	17	SCA	Maintained	Roadside Contamination
Q	89	Lewiston	Landfill, Maintained, and Overgrown Areas	Railroad Bed
R	5	Niagara Mohawk	Some Brush	Shine and Spotty
S	23	SCA	Overgrown	Ditch, Road, and One Spot
T	20	SCA	Overgrown	Ditch and Roadsid Contamination
U	12	Somerset	Maintained	Ditch and Roadsid Contamination
V	38	Somerset	Maintained	Ditch and Roadsid Contamination
W	5	SCA	Overgrown	Ditch and Small Area
X	22	Lewiston	Overgrown	Ditch and Roadsid Contamination
West of Site	**	Niagara Mohawk	Overgrown	Underground Piping
Igloo No. 9050	**	USAF	Occupied	None Found in Preliminary Survey

* Based on 1973 Radiological Survey Report (Robinson, 1973).

** Not covered by 1973 radiological survey.

Table 1. Summary of Plot Data

The Former Lake Ontario Ordnance Works (continued)

4. Radiation Levels

Maximum Radiation Level	Type of Measurement	Frequency of Monitoring	Monitored by
On the DOE site:			
8 m R/hr	Beta-gamma	1 time	DOE
> 200 pCi/l	Radon	1 time	DOE
at fenceline:			
>3 p Ci/l	Radon	Monthly	DOE
Off the DOE Site:			
≈50 μR/hr	External gamma	1 time	AEC
< 3 p Ci/l	Radon	Monthly	DOE

5. Decontamination Plans

The current DOE storage site is included in the Department's surplus sites decontamination program. Decommissioning plans are pending resolution of the final disposition of residue being stored on the site for Afrimet Corp.

Areas that were part of the former AEC site that are not owned by DOE are scheduled or are being scheduled for survey. Remedial actions have been (completed by the owner) at one property and are being completed by DOE at the offsite ditches.

IDENTIFICATION OF RADIOLOGICALLY CONTAMINATED SITES

Weldon Spring Quarry
St. Charles County, MO 63302

Point of Contact: Department of Energy, Defense Programs - A. Kluk

1. Contaminated Site Data

The quarry includes about 8.6 acres and is located between Missouri State Rt. 94 and Femme Osage Creek. The site was originally used by the Department of the Army for disposing of trinitrotoluol-contaminated rubble. The AEC acquired title to the site in 1958 and used it for the disposal of drummed residue containing 3.8% thorium. Then from 1963 to 1964 about 50,000 cubic yards of uranium- and radium-contaminated rubble were deposited at the quarry. Additional thorium residue was placed in the quarry in 1966. In 1967, during the decontamination of several buildings at the Weldon Spring processing plant, the Army deposited approximately 6,000 cubic yards of contaminated and unrecoverable material in the quarry.

2. Operational Data

Name	Status	Dates
Weldon Spring Quarry	Used for disposal of residue and rubble	1950's to present

3. Type of Contamination

Table I

Waste	Volume Ft^3	S.S. Materials (Kg)	Radioactivity (Curie)
3.8% thorium residues	5,000	4,500	.25
Destrehan Street Plant Demolition Rubble	1,350,000	--	1.0
3% thorium residues	~15,000	11,800	1.0
Weldon Spring Decontamination Rubble	~150,000	--	--

Weldon Spring Quarry

4. Radiation Levels

The concentration of selected radionuclides and chemical compounds in water are given below:

Sample Description* (samples collected 10/13-14/76)	mg/l						d/m/ml	
	pH	Cl	NO_3	F	U	Th	Ra-226	Ra-228
5 - St. Charles Co. Water Treatment Plant, incoming flow	7.9	9	0.5	-	0.001	-	0.002	0.002
6 - Little Femme Osage Creek at State Route 94, upstream from quarry	7.8	9	0.6	-	0.001	-	<0.001	<0.001
7 - Little Femme Osage Creek at MK&T RR bridge, downstream from quarry	7.8	9	0.5	-	0.002	-	<0.001	<0.001
9 - Femme Osage slough, about 600 feet SSW of quarry	7.8	11	3.0	-	0.14	-	0.001	0.001
10 - Femme Osage slough, at dock, 2220 feet east of quarry	7.6	11	2.0	-	0.04	-	0.001	0.001
11 - Quarry, at end of platform 6'4" under water surface	7.9	20	1.9	-	4.8	0.011	0.003	0.001
76-43 TW No. 1, dip sample	7.3	22	1.3	-	4.6	0.009	0.002	0.001
76-44 TW No. 2, dip sample	7.0	13	0.6	-	0.10	0.004	0.001	0.001
76-45 TW No. 3, dip sample	7.4	23	1.2	-	2.0	0.009	0.001	0.001
76-46 TW No. 4, dip sample	7.2	14	0.6	-	0.60	0.006	0.001	<0.001

*Sample locations are shown in figure 1 and 2

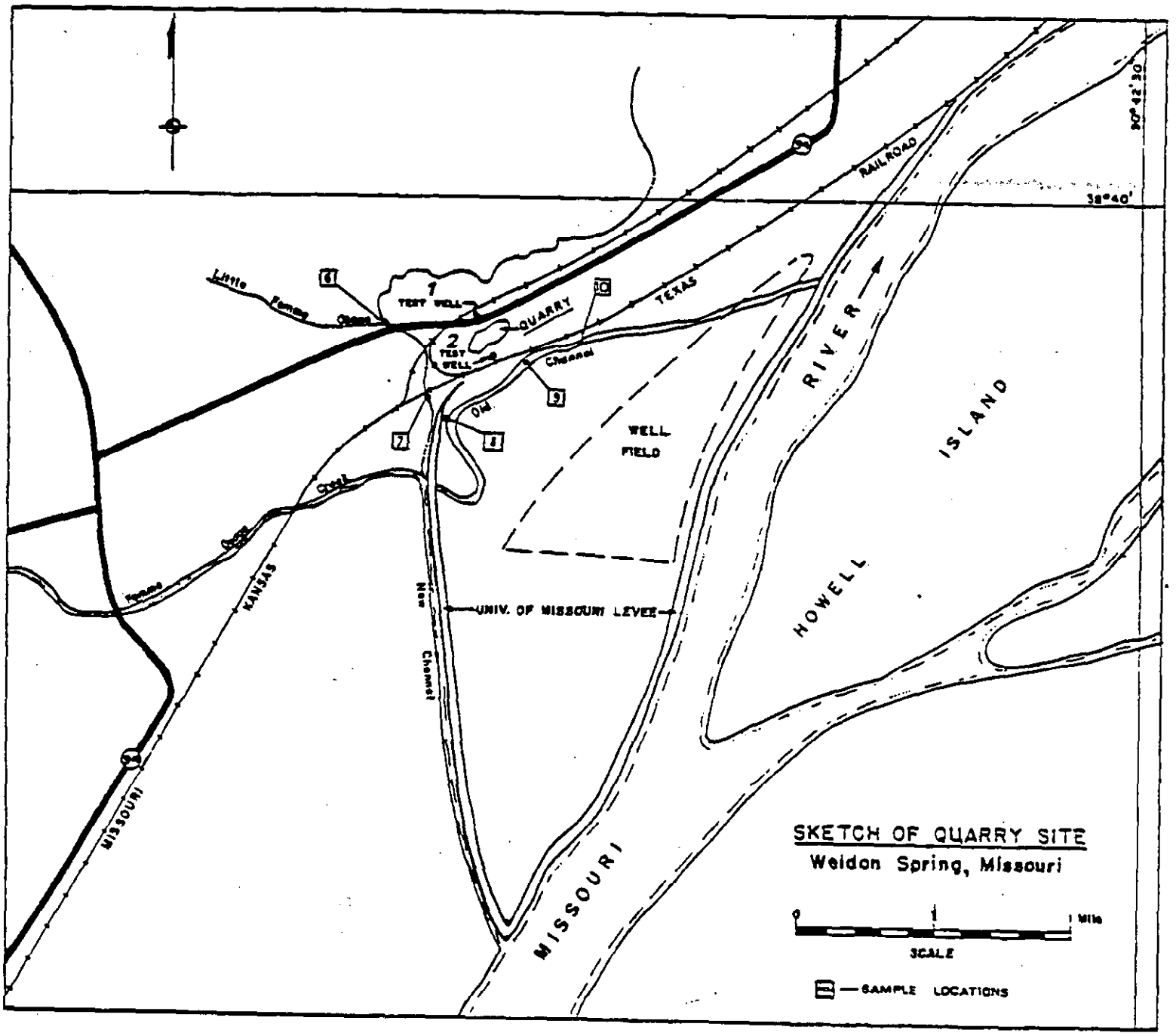

RAILROAD
38°40'
90°42'30"
Little Femme Osage
1
TEST WELL
2
TEST WELL
QUARRY
TEXAS
Channel
Old
RIVER
WELL
FIELD
ISLAND
HOWELL
Femme Osage
Creek
KANSAS
New
Channel
UNIV. OF MISSOURI LEVEE
MISSOURI
MISSOURI
SKETCH OF QUARRY SITE
Weldon Spring, Missouri
0
1
1 Mile
SCALE
— SAMPLE LOCATIONS

Figure 1

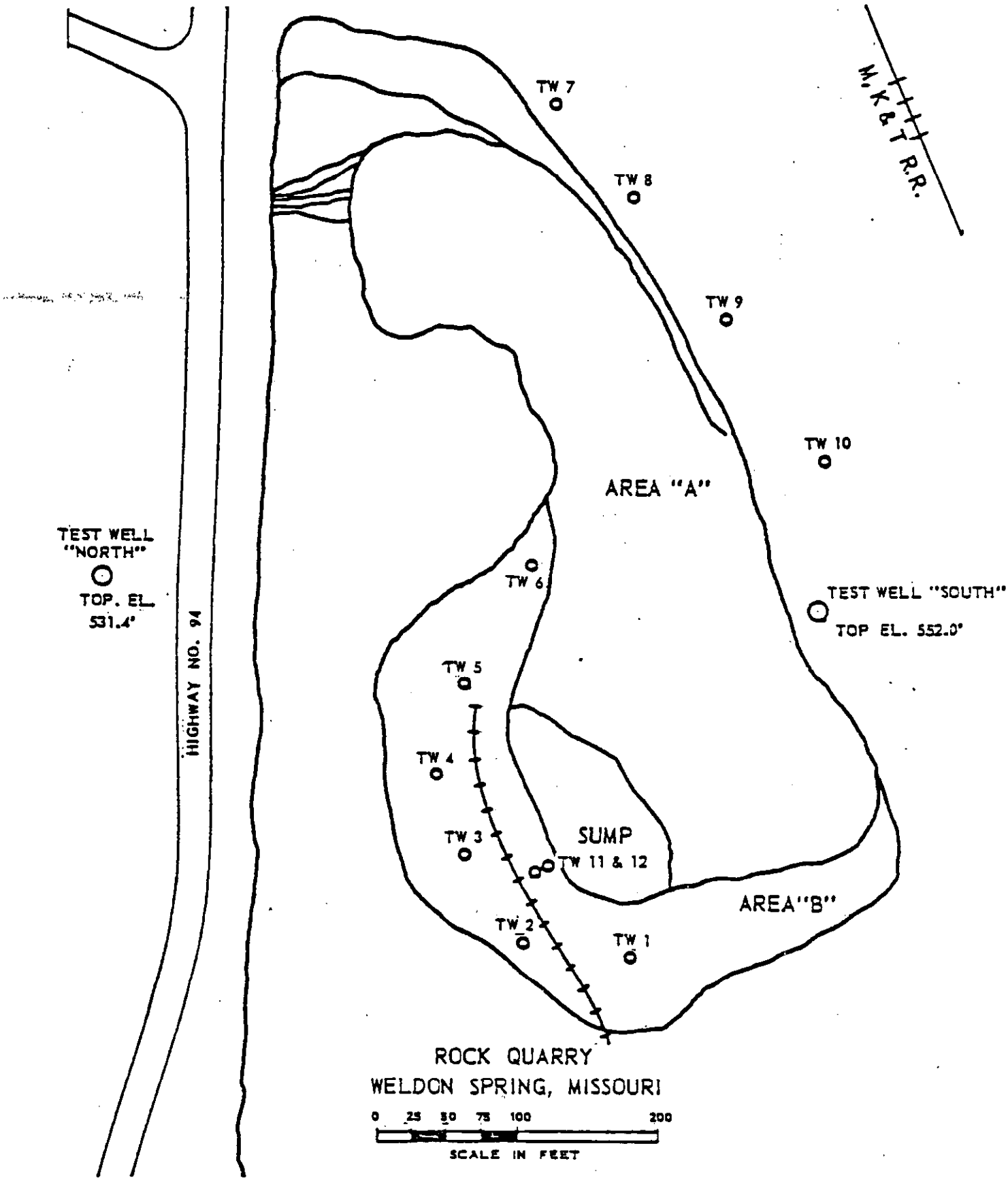

TW 7
TW 8
TW 9
TW 10
M.K.&T. R.R.
AREA "A"
TEST WELL "NORTH"
TOP. EL. 531.4'
HIGHWAY NO. 94
TW 6
TEST WELL "SOUTH"
TOP EL. 552.0'
TW 5
TW 4
TW 3
SUMP
TW 11 & 12
AREA "B"
TW 2
TW 1
ROCK QUARRY
WELDON SPRING, MISSOURI
0 25 50 75 100 200
SCALE IN FEET

Figure 2

5. Decontamination Plans

The Department of Energy plans remedial action at this site. However, implementation of the action is dependent on the availability of resources and is not scheduled until the raffinate pits action plans are implemented.

IDENTIFICATION OF RADIOLOGICALLY CONTAMINATED SITES

Weldon Spring Chemical Plant
St. Charles County, MO 63302

Point of Contact: Department of Army, Manager of Chemical Demilitarization

1. Contaminated Site Data*

The site consists of approximately 169 acres** with 5 major processing buildings and 39 other support buildings or acres. Acres used in past uranium processing and thorium processing activities are designated in the attached figure as 100,200 or 300 series and support facilities are 400 series.

2. Operational Data

Name	Status	Dates
Feed Materials Plant (processed uranium Thorium ore)	Past	1957-1966

3. Type of Contamination

The plant is contaminated with various uranium and thorium compounds and their associated decay products including radium.

4. Radiation Levels

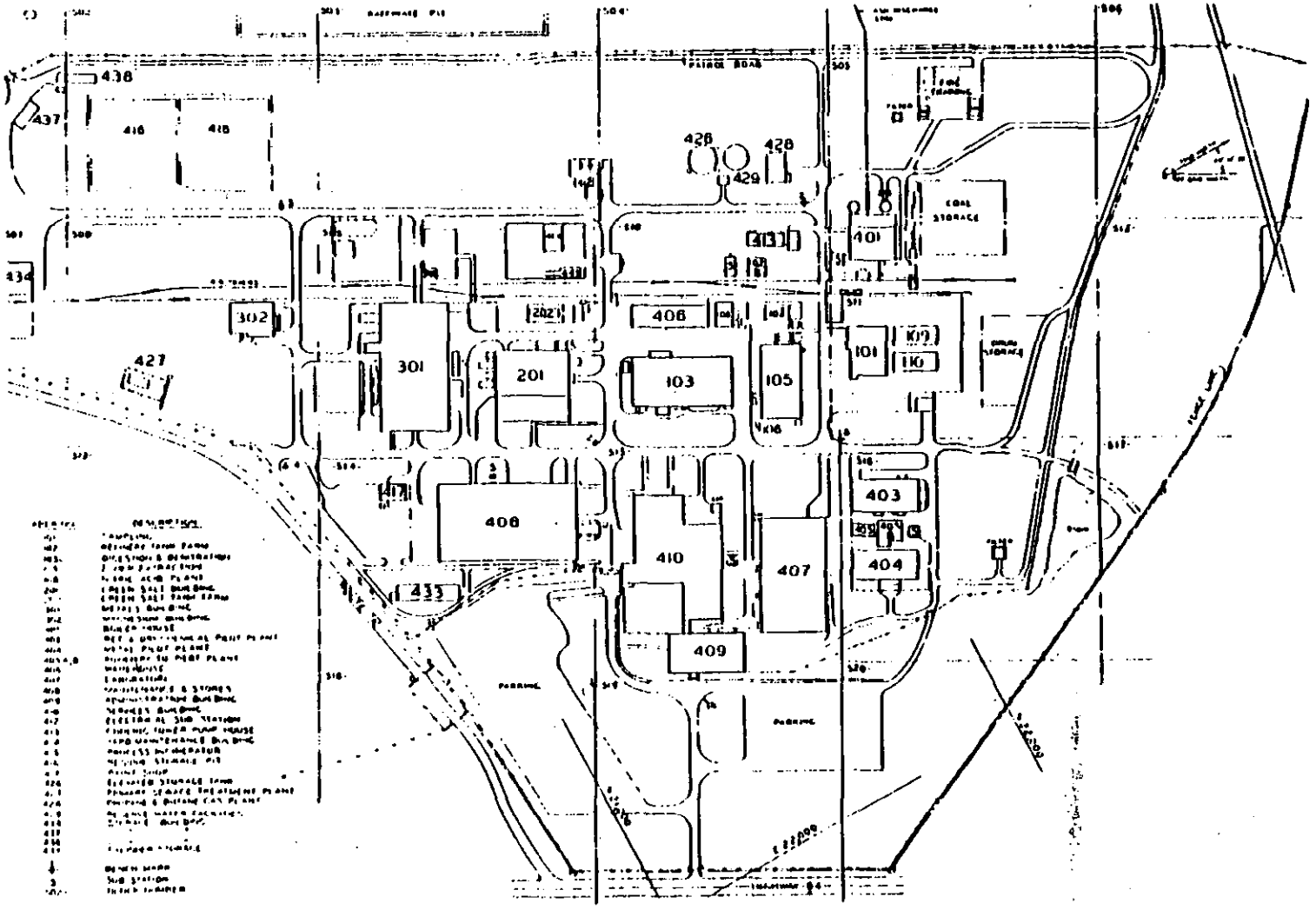
The Department of Energy has no onsite data documenting the current radiological condition of the site. However, an ORNL study indicated doses of the site could exceed 25 m rem/year wholebody and 200 m rem/year to the critical organ (bone) but it appears more likely that the doses would be < 0.5 m rem/year to the wholebody and 5 m rem/year to the bone.

5. Decontamination Plans

The Department of Energy has no data regarding decontamination activity.

*Data primarily from Department of Army Draft Report, "Weldon Spring Chemical Plant Survey and Assessment"

**Part of the 219 acres of the former AEC Uranium Feed Materials Plant which was previously the Weldon Spring Ordnance Works.



WELDON SPRING CHEMICAL PLANT

IDENTIFICATION OF RADIOLOGICALLY CONTAMINATED SITES

Seneca Army Depot
Department of the Army
Seneca Army Depot
Romulus, NY 14541

Point of contact: Col. J. Hudak, Commanding Officer

1. Contaminated Site Data

The site consists of about 10,000 acres, located west of Romulus, New York. Munitions bunkers on the site, about 11, were used by the Manhattan District for the storage of about 2,000 barrels of high grade pitchblende ore. The bunkers involved included E0801, E0802, E0803, E0804, E0805, E0806, E0807, E0808, E0809, E0810, and E0811.

2. Operational Data

The Department of Energy review only includes the Manhattan District activities:

Name	Status	Dates
Storage of Pitchblende Ore	Past	Early 1940's

3. Type of Contamination

Site is contaminated with residual pitchblende ore, which has equilibrium amounts of U-238 and its decay products including radium and radon.

4. Radiation Level*

Maximum Radiation Level	Type of Measurement	Frequency of Monitoring	Monitored by
31 μR/hour	External/Gamma	1 time	DOE
7820 pCi/gram	Radium in soil	1 time	DOE
67,070 pCi/gram	Uranium in soil	1 time	DOE
6-7 pCi/l	Radon in the air	1 time	DOE
Estimated at less than 0.06 WL	Radon daughter concentration	1 time	DOE

Seneca Army Depot (continued)

5. Decontamination Plans

A. Start date undetermined

B. Completion date undertermined (costs may range up to $400,000 depending on clean up option)

C. Under current use none necessary

D. DOE is not aware of any violations

E. License status of the facility is not known by DOE